

CLAIMS

We claim:

- 1 1. A method for dynamically varying a frequency response of a frequency
2 selective surface, comprising the steps of:
3 controlling a transmission of electromagnetic energy through a surface by
4 passing selected frequencies in a pass-band and blocking selected frequencies in a
5 stop-band; and
6 dynamically modifying at least one of said pass-band and said stop-band by
7 selectively varying at least one of a position and a volume of a conductive fluid
8 forming at least a portion of said surface.
- 1 2. The method according to claim 1 further comprising the step of forming a
2 plurality of elements of said frequency selective surface to have a shape selected
3 from the group consisting of tripole, circles, crosses, Jerusalem crosses, rings,
4 rectangles and squares.
- 1 3. The method according to claim 1 further comprising the step of forming a
2 plurality of elements of said frequency selective surface by defining periodic
3 perforations of a selected geometry in a conductive ground plane.
- 1 4. The method according to claim 3 wherein said dynamically modifying step
2 further comprises the step of injecting said conductive fluid into a fluid channel
3 formed adjacent to a portion of said conductive ground plane.
- 1 5. The method according to claim 4 further comprising the step of electrically
2 coupling said conductive fluid contained in said channel to said conductive ground
3 plane.
- 1 6. The method according to claim 3 further comprising the step of disposing said
2 conductive ground plane on a dielectric substrate.

1 7. The method according to claim 6 further comprising the step of constraining
2 said conductive fluid in a cavity structure defined within said dielectric substrate.

1 8. The method according to claim 7 further comprising the step of forming said
2 cavity structure within a portion of said dielectric substrate entirely within a boundary
3 defined by said conductive ground plane.

1 9. The method according to claim 1 further comprising the step of selecting said
2 conductive fluid to be formed of gallium and indium alloyed with a material selected
3 from the group consisting of tin, copper, zinc and bismuth.

1 10. The method according to claim 1 further comprising the step of varying at
2 least one of said position and said volume of said conductive fluid in response to a
3 control signal.

1 11. The method according to claim 1 wherein said dynamically modifying step is
2 further comprised of changing at least one dimension of a plurality of periodic
3 elements of said frequency selective surface.

1 12. The method according to claim 1 wherein said dynamically modifying step is
2 further comprised of changing a shape of said plurality of periodic elements.

1 13. A dynamically variable frequency selective surface, comprising:
2 a periodic resonance structure having a plurality of elements periodically
3 spaced over a surface, each of said elements having a resonant frequency;
4 a conductive fluid; and
5 a fluid control system dynamically varying at least one of a position and a
6 volume of said conductive fluid within said periodic resonance structure to change at
7 least one dimension of said plurality of elements.

- 1 14. The dynamically variable frequency selective surface according to claim 13
- 2 wherein said plurality of elements are comprised of periodic perforations of a
- 3 selected geometry in a conductive ground plane.

- 1 15. The dynamically variable frequency selective surface according to claim 14
- 2 wherein said fluid control system selectively adds and removes said conductive fluid
- 3 from a fluid channel formed adjacent to a portion of said conductive ground plane.

- 1 16. The dynamically variable frequency selective surface according to claim 15
- 2 wherein said conductive fluid contained in said channel is electrically coupled to said
- 3 conductive ground plane.

- 1 17. The dynamically variable frequency selective surface according to claim 14
- 2 wherein said conductive ground plane is disposed on a dielectric substrate.

- 1 18. The dynamically variable frequency selective surface according to claim 17
- 2 further comprising a cavity structure defined within said dielectric substrate for
- 3 storing a predetermined volume of said conductive fluid.

- 1 19. The dynamically variable frequency selective surface according to claim 18
- 2 wherein said cavity structure is disposed within a portion of said dielectric substrate
- 3 entirely within a boundary defined by said conductive ground plane.

- 1 20. The dynamically variable frequency selective surface according to claim 13
- 2 wherein said conductive fluid is comprised of gallium and indium alloyed with a
- 3 material selected from the group consisting of tin, copper, zinc and bismuth.

- 1 21. The dynamically variable frequency selective surface according to claim 13
- 2 wherein said fluid control system is responsive to a control signal.

1 22. The dynamically variable frequency selective surface according to claim 13
2 wherein said fluid control system dynamically modifies said resonant frequency.

1 23. The dynamically variable frequency selective surface according to claim 13
2 wherein said plurality of elements have a shape selected from the group consisting
3 of tripodes, circles, crosses, Jerusalem crosses, rings, rectangles and squares.

1 24. A dynamically variable frequency selective surface, comprising:
2 a periodic resonance structure having a plurality of elements periodically
3 spaced over a surface, each of said elements having a resonant frequency;
4 a conductive fluid; and
5 a fluid control system for dynamically varying at least one of a position and a
6 volume of said conductive fluid within said periodic resonance structure to change a
7 shape of said plurality of elements.